CLAIMS

What is claimed is:

Claim 1. In a planar oxygen sensor having a pump cell, a reference cell, a sensor chamber and a heating device, a ground plane electrode comprising:

a sensing portion having a first sense lead and a second sense lead; and

a measuring portion having a first measuring lead and a second measuring lead, wherein said first measuring lead and said second measuring lead have increased surface area relative to said sensing portion such that the resistance between said first measuring lead and said second measuring lead is reduced and wherein said first measuring lead is disposed so as to be communicated with said first sense lead and said second measuring lead is disposed so as to be communicated with said second sense lead.

Claim 2. The planar oxygen sensor according to claim 1, further comprising a temperature measurement device, wherein said temperature measurement device includes a first device terminal communicated with a first capacitor and a second device terminal communicated with a second capacitor.

Claim 3. The planar oxygen sensor according to claim 2, wherein said first device terminal is communicated with said first measuring lead and wherein said second device terminal is communicated with said second measuring lead.

Claim 4. The planar oxygen sensor according to claim 2, wherein said temperature measurement device includes an AC signal source, wherein said AC signal source is communicated with said first device terminal and said second device terminal.

Claim 5. The planar oxygen sensor according to claim 2, wherein said temperature measurement device includes a voltage divider, wherein said voltage divider is communicated with said first device terminal and said second device terminal.

Claim 6. The planar oxygen sensor according to claim 1, further comprising a first isolation layer non-movably associated with said ground plane electrode, wherein said first isolation layer is disposed so as to separate said ground plane electrode from said heating device.

Claim 7. The planar oxygen sensor according to claim 1, further comprising a ground terminal, a resistance measurement terminal, a power terminal and a second isolation layer non-movably associated with said heating device, wherein said second isolation layer is disposed so as to separate said heating device from said ground terminal, said resistance measurement terminal and said power terminal.

Claim 8. The planar oxygen sensor according to claim 1, further comprising a first isolation layer, wherein said first isolation layer is non-movably associated with a portion of said ground plane electrode.

Claim 9. The planar oxygen sensor according to claim 1, further comprising a ground terminal, a resistance measurement terminal, a power terminal and a second isolation layer, wherein said second isolation layer is non-movably associated with said heating device and a portion of said ground plane electrode and wherein said second isolation layer is disposed so as to separate said heating device and said portion of said ground plane electrode from said ground terminal, said resistance measurement terminal and said power terminal.

Claim 10. The planar oxygen sensor according to claim 1, wherein said measuring portion is constructed from platinum.

Claim 11. The planar oxygen sensor according to claim 1, wherein said measuring portion is constructed from a composite of gold, rhodium and platinum.

Claim 12. The planar oxygen sensor according to claim 1, wherein said sensing portion is constructed of a negative resistance temperature detector material.

Claim 13. The planar oxygen sensor according to claim 1, wherein said sensing portion is constructed of a positive resistance temperature detector material.

Claim 14. The planar oxygen sensor according to claim 1, wherein said measuring portion is constructed from a metal oxide material.

Claim 15. The planar oxygen sensor according to claim 1, wherein said measuring portion is constructed from an alloy material.

Claim 16. The planar oxygen sensor according to claim 1, further comprising a ground terminal, a resistance measurement terminal, a power terminal wherein said ground terminal is communicated with said first measuring lead and said heating device.

Claim 17. The planar oxygen sensor according to claim 1, wherein said resistance measurement terminal is communicated with said second measuring lead.

Claim 18. The planar oxygen sensor according to claim 1, wherein said power terminal is communicated with said heating device.

Claim 19. In a planar oxygen sensor having a pump cell, a reference cell, a sensor chamber, a heating device and a ground plane electrode that includes a sensing portion having a first sense lead and a second sense lead and a measuring portion having a first measuring lead and a second measuring lead, a method for measuring the temperature of said planar oxygen sensor comprising:

obtaining a temperature measurement device;

communicating said temperature measurement device with said first measuring lead and said second measuring lead;

operating said planar oxygen sensor so as to cause said heating device to heat said planar oxygen sensor; and

measuring the resistance between said first measuring lead and said second measuring lead.

Claim 20. The method of claim 19, wherein said temperature measurement device includes a first device terminal and a second device terminal.

Claim 21. The method of claim 20, wherein said temperature measurement device includes a first capacitor and a second capacitor, wherein said first capacitor is communicated with said first device terminal and said second capacitor is communicated with said second device terminal.

Claim 22. The method of claim 20, wherein said communicating said temperature measurement device includes communicating said first measuring lead with said first device terminal and communicating said second measuring lead with said second device terminal.

Claim 23. The method of claim 19, wherein said operating said planar oxygen sensor includes communicating said planar oxygen sensor with a power supply.

Claim 24. The method of claim 19, wherein said measuring includes measuring said resistance between said first measuring lead and said second measuring lead using said temperature measurement device.

Claim 25. The method of claim 19, wherein said measuring includes introducing an AC signal into said planar oxygen sensor so as to cause a voltage potential between said first measuring lead and said second measuring lead, wherein said voltage potential is responsive to the resistance between said first measuring lead and said second measuring lead.

Claim 26. The method of claim 25, wherein said measuring includes measuring said voltage potential between said first measuring lead and said second measuring lead.

Claim 27. The method of claim 26, wherein said measuring includes converting said voltage potential into a resistance value responsive to the resistance between said first measuring lead and said second measuring lead.

Claim 28. The method of claim 27, wherein said measuring includes converting said resistance value into a temperature value responsive to the temperature of said planar oxygen sensor.